



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: AN ACARICIDAL COMPOSITION AND USE THEREOF IN DISINFESTING TREATMENTS

## (57) Abstract

The invention relates to a composition that is effective in fighting infestations from mites, particularly against the Varroa Jacobsoni acarus, a honeybees parasite. The composition is constituted by a mixture of elementary sulphur powder, garlic bulbs that have been crushed or reduced to a pulp, ethanol, and in case, dried pepper powder. In a preferred composition the above components are present in weight ratios of 30:30:30:10, respectively. The invention further includes the use of the composition as an acaricidal agent in treatments of disinfestation, as well as the preventive use thereof for prophylaxis purposes.

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AN ACARICIDAL COMPOSITION AND USE THEREOF IN DISINFESTING  
TREATMENTS

The present invention relates to an acaricidal composition, particularly to a composition that is effective against the Varroa Jacobsoni acarus.

The invention further refers to the use of such a composition in the struggle against mites, both as a pesticidal agent and for prophylaxis purpose.

It is known that the Varroa Jacobsoni acarus, commonly called "varroa", is a vermin of the bees - particularly the *Apis mellifica* bee - that infests the hives causing heavy economical losses, settling as a preference in the male cells.

The treatments employed to fight the infestation of varroa are either mechanical or chemical.

Mechanical treatments consist in providing the beehives with traps exploiting the mite's preference for the male cells. However positive results are achieved slowly and are not very satisfying since the traps only limit the infestation.

The chemical treatments consist in applying synthetic pesticides. Under these conditions, there exists a toxicity problem for the beekeeper employing the pesticide, as well as a contamination problem of the produced honey, so that sanitary regulations forbid the treatment with such pesticides near the fertility time of the bees and for a certain time thereafter. Therefore the treatment with synthetic pesticides, although employed by many beekeepers, cannot be considered an

effective solution in all respects.

It has now been found a composition that is effective against the Varroa Jacobsoni acarus and against many other kinds of mites, that is not a chemical product obtained by synthesis and therefore does not imply the above mentioned drawbacks of the known products. On the contrary, the composition according to the invention is a mixture of natural products that are well tolerated by the bees, as well as by the other animal or vegetable organisms that are infested by mites, and do no contaminate the honey.

Such acaricidal composition according to the invention is generally made up by a mixture of elementary sulphur, crushed garlic bulbs and ethanol.

Garlic bulbs are obtained by the plant of the genus Allium, more particularly of the species Allium sativum. The bulblets are crushed, milled or more preferably reduced to a pulp to form a mush from which, through the use of ethanol, an alcoholic extract is obtained which contains the garlic active ingredients.

Elementary sulphur is used as a fine powder, preferably in the form known as "wettable ventilated sulphur".

Ethanol is both an active ingredient of the composition and the medium for the solution and the suspension of the other components thereof.

The composition according to the invention contains from 20 to 40% by weight of elementary sulphur, from 15 to 35% by weight of garlic bulbs, the balance being ethanol.

Depending upon the ethanol amount, the composition appears

as a liquid or thick composition which is obtained by mixing the solid components in the liquid medium.

According to another characteristic of the invention, the composition contains also pepper, preferably of the species *Capsicum annuum*, of sour and piquant varieties, dried and reduced to powder. The amount of dried pepper in the mixture can be between 1 and 15% by weight of the total.

In the preferred embodiment including four components, the composition according to the invention contains from 20 to 40% of elementary sulphur, from 15 to 35% of crushed garlic bulbs, from 1 to 15% of pepper powder, and from 64 to 10% of ethanol, all the components being expressed by weight. The preferred composition contains 30% of elementary sulphur, 30% of garlic bulbs that have been crushed or reduced to a pulp, 30% of 99% by volume ethanol, and 30% of pepper powder, all the components being given by weight.

The composition is prepared by mixing the components in a vessel by means of a mechanical stirrer until it is obtained a sufficiently homogeneous dispersion of the solid parts into the liquid or a paste with a consistency that depends upon the ethanol amount.

Then the composition is applied to the parts that have been infested by the mites, usually by smearing it with a brush.

If the product density so allows, it is possible also a spray application by means of devices that are commonly used for such purposes.

When used against verroa, the composition is smeared over

the side walls, bottom walls and over the cover of each hive, and if necessary the application is repeated until the substantial regress or the disappearance of the infestation.

The exact reasons why the composition is so effective as an acaricide agent have not yet been fully investigated and understood. It is supposed that each component carries out a germicidal and antiseptic action resulting in an overall effect that is as deadly to the mites as harmless to the infested organism, be it the bee or another animal or vegetable organism. The composition according to the invention has been particularly developed against the Varroa Jacobsoni acarus, since this latter causes quite damaging infestations in apiculture. Nevertheless the composition has been experimented also against other parasitic infestations, such as those affecting chickens or rosebushes, in both cases with positive effects.

Therefore the invention also includes the use of the composition as an acaricide agent, particularly against Varroa Jacobsoni acarus.

A few examples illustrating the invention are given hereinbelow.

EXAMPLE 1

In a 250 ml vessel 40 g of double ventilated elementary sulphur and 45 g of 95% by volume ethanol are mixed. 15 g of garlic bulbs are added, in form of bulblets that were deprived of the envelopping membrane, reduced to a pulp in a hydraulic squeezer of stainless steel, aluminum or plastics. Both the juice and the crushed fibrous portion of the garlic are added

to the mixture of sulphur and ethanol. The mixture is then stirred by a mechanical stirrer until a homogeneous suspension is obtained.

The composition is applied by means of a brush over the area infested by the mites. After a few weeks a substantial regress of the infestation was reported.

EXAMPLE 2

In a 250 ml vessel 20 g of double ventilated elementary sulphur, 35 g of garlic bulbs as obtained in example 1, and 45 g of 95% by volume ethanol are mixed. The mixture is stirred. This way it is obtained a suspension suitable to be applied by brushing or spraying over the area infested by the mites.

After a few weeks a substantial regress of the infestation was reported.

EXAMPLE 3

In a 250 ml vessel 20 g of double ventilated elementary sulphur, 30 g of garlic bulbs as obtained in example 1, 45 g of 99% by volume ethanol and 5 g of dried pepper powder (*Capsicum annuum*) piquant variety are mixed. The mixture is stirred and the resulting suspension is applied by means of a brush over the side walls, the bottom wall and the cover of a hive for breeding *Apis mellifica*. After three months the hive was inspected and a substantial regress of the infestation was reported.

EXAMPLE 4

In a 250 ml vessel 30 g of double ventilated elementary sulphur, 30 g of crushed garlic bulbs as obtained in example 1, 10 g of dried pepper powder (*Capsicum annuum*) piquant

variety, and 30 g of 99% by volume ethanol are mixed. The mixture is stirred by means of a mechanical stirrer to a thick consistency.

The composition is applied to a hive for breeding *Apis mellifica* infested by *Varroa Jacobsoni*, located in northwest Italy, by covering both the side walls and the bottom and the cover of the hive. The application was made in the month of June. The hive bottom was 30 x 30 cm. After about three months (at the end of August) the hive was inspected and a number of dead mites between 40,000 and 42,000 was counted on the hive bottom. The hive bottom has been cleaned and the treatment has been repeated using the same composition in the same way as above. After about two months (at the end of October) the hive has been inspected again. About 500 dead mites were counted on the hive bottom. After properly cleaning, the treatment has been applied again with the same composition. After about four months (at the end of February in the following year) the inspection was repeated and a single dead mite was found on the hive bottom. An examination of the bees showed the absence of the parasite.

The treatment neither influenced the breeding conditions, nor the quality of the produced honey.

The composition can also be used with prophylaxis purposes against the mites, i.e. as a preventive treatment to avoid the infestation.

CLAIMS

1. An acaricidal composition comprising sulphur powder, garlic that has been ground or reduced to a pulp, and ethanol.
2. A composition as claimed in claim 1, characterized in that the sulphur amount is from 20 to 40% by weight, the garlic bulbs amount is from 15 to 35% by weight, the balance being ethanol.
3. A composition as claimed in the preceding claims, characterized in that it further comprises from 1 to 15% by weight of pepper powder.
4. A composition as claimed in claim 3, characterized in that it comprises from 20 to 40% of elementary sulphur, from 15 to 35% of crushed garlic bulbs, from 1 to 15% of pepper powder, and from 64 to 10% of ethanol.
5. Use of the composition as claimed in anyone of the preceding claims, as an acaricidal composition.
6. Use of the composition as claimed in anyone of the claims 1 to 4, as a disinfecting agent against the Varroa Jacobsoni acarus in apiculture.
7. A prophylaxis method against the infestation of the Varroa Jacobsoni acarus in apiculture comprising the application to the walls of the hives for bees breeding of a composition according to any of claims 1 to 4.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/EP 90/00744

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC: 5 A 01 N 65/00, // (A 01 N 65/00, 65:00, 59:02, 31:02)

## II. FIELDS SEARCHED

Minimum Documentation Searched ?

Classification System	Classification Symbols
IPC <sup>4</sup>	A 01 N

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

## III. DOCUMENTS CONSIDERED TO BE RELEVANT\*

Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	FR, A, 2565782 (A. WEBER) 20 December 1985, see claims 1,4,5 --	1-7
A	Chemical Abstracts, vol. 82, no. 15, 14 April 1975 (Columbus, Ohio, US) B.C. Smith et al.: "Site preference and oviposition of Tetranychus urticae (Acarina: Tetranychidae) on bean with innocuous chemicals and pesticides", see page 129, abstract 94140p & Environ. Entomol. 1974, 3(4), 697-700 --	1-7
A	DE, C, 1767616 (J. EIWIESER) 23 December 1971, see claim 1 --	1-7
A	Chemical Abstracts, vol. 49, no. 14, 25 July 1955 (Columbus, Ohio, US) H.U. Gubler et al.: "A new remedy specific against acarine disease", see column 9860f, & J. Suisse Apicult. 50, 193-197 (1953) --	1-7

\* Special categories of cited documents: <sup>10</sup>

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"A" document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search

26th July 1990

Date of Mailing of this International Search Report

12.08.90

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

  
M. SOTELO

## FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A	Chemical Abstracts, vol. 49, no. 3, 10 February 1955 (Columbus, Ohio, US) G. Čatár: "Effect of plant extracts on Ixodes Ricinus" see column 2002f, & Bratislav. Lekárské Listy, 34, 1004-1010 (1954) --	1-7
A	CH, A, 193276 (O. FIVIAN) 2 May 1938, see the whole document	1-7

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V.  OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND PARTIALLY SEARCHABLE

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1.  Claim numbers 5, 6, because they relate to subject matter not required to be searched by this Authority, namely:

see PCT - article 17 (2) (b)  
PCT - Rule 39.1 (IV)

2.  Claim numbers \_\_\_\_\_, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3.  Claim numbers \_\_\_\_\_, because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI.  OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This International Searching Authority found multiple inventions in this international application as follows:

1.  As all required additional search fees were timely paid by the applicant, this International search report covers all searchable claims of the International application.

2.  As only some of the required additional search fees were timely paid by the applicant, this International search report covers only those claims of the International application for which fees were paid, specifically claims:

3.  No required additional search fees were timely paid by the applicant. Consequently, this International search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4.  As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

## Remark on Protest

The additional search fees were accompanied by applicant's protest.

No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

EP 9000744  
SA 36521

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 28/08/90. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A- 2565782	20-12-85	None	
DE-C- 1767616	23-12-71	None	
CH-A- 193276		None	